

# INSTRUMENT SELECTION GUIDE.

Pressure, differential-pressure, temperature, flow and level instruments — with a focus on Rosemount and WIKA transmitters: model codes, materials, outputs, hazardous-area approvals and RFQ inputs.

# Inside this catalog.

A practical guide for instrument engineers, buyers and EPC procurement teams — so the first inquiry already contains everything a supplier needs to quote the right device.


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# Measurement that matches the process.

An instrument is a chain: sensing principle, wetted materials, electronics, signal, approvals and installation hardware. If one link is wrong, the whole tag fails at site acceptance.



PRESSURE TRANSMITTERS AND GAUGES ON A PROCESS LINE

**PRESSURE**

Transmitters, gauges, switches and diaphragm seals

**DIFFERENTIAL PRESSURE**

Flow, level and filter-monitoring with DP transmitters

**TEMPERATURE**

RTDs, thermocouples, thermowells, head and rail transmitters

**FLOW**

Magnetic, vortex, Coriolis, ultrasonic, DP-based and variable-area

**LEVEL**

Radar (guided-wave / non-contact), DP, displacer, ultrasonic, switches

**ANALYTICS**

pH / ORP, conductivity, dissolved oxygen, gas detection, density

**2012**

PTF project-supply experience since

**40+**

Global manufacturers in the sourcing network

**6**

Instrument families covered in this guide

# Seven decisions define a correct instrument.

Work through the steps in order. The answers become the RFQ, the model code and, later, the acceptance checklist.

1. **Define the measurement**
   Pressure (gauge / absolute / DP), temperature, flow or level — and whether it is for control, safety or monitoring.

2. **Range & turndown**
   Calibrated span, upper range limit, normal / maximum operating value, overpressure and static-pressure limits.

3. **Wetted materials**
   Diaphragm, process connection, O-rings and fill fluid compatible with the process fluid and temperature.

4. **Output & protocol**
   4–20 mA + HART, FOUNDATION Fieldbus, PROFIBUS PA, WirelessHART, Modbus; display and power.

5. **Hazardous area & SIL**
   ATEX / IECEx zone, gas group, temperature class, protection type, ingress rating, SIL requirement.

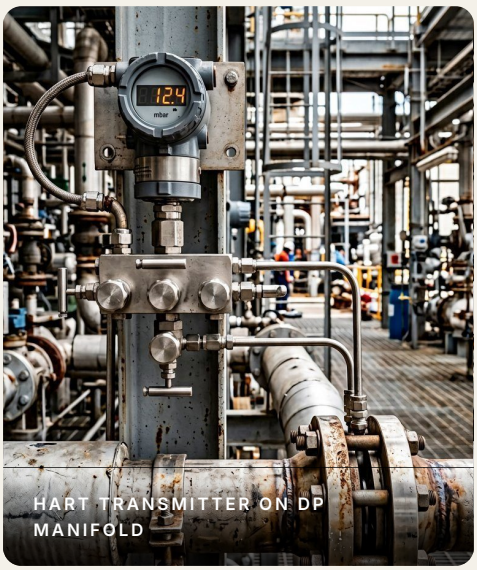
6. **Connection & accessories**
   Process connection, manifold, remote seal, bracket, cable gland, thermowell, tagging.

7. **Documents & inspection**
   Calibration certificate, material certificate, Ex certificate, COC, safety manual, FAT or TPI.

**GOLDEN RULE**

## “3051” is not an RFQ.

Without type, range, materials, output and approvals, no supplier can offer a comparable model code.



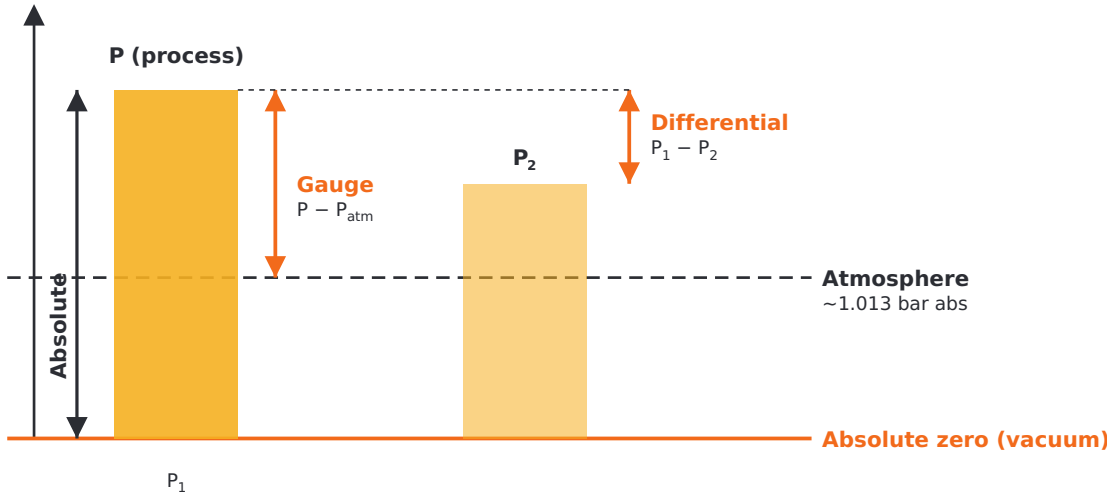
HART TRANSMITTER ON DP MANIFOLD

**TAG LIST FIRST**

Start from the instrument index / datasheet so each tag number maps to one model code.

# Pressure fundamentals: reference defines the type.

The same process pressure reads differently depending on the reference. Choose the pressure type before the model.




GAUGE (G)

### Referenced to atmosphere

Reads zero when open to air. Most common for tanks, lines and pumps. Can go negative (vacuum).

ABSOLUTE (A)

### Referenced to vacuum

Sealed reference. Needed where barometric changes matter: vacuum systems, boiling, steam properties.

DIFFERENTIAL (D)

### Difference between two ports

Flow (across an orifice), level (tank head), filter & strainer fouling, pump head.

## RANGE SELECTION — PRACTICAL RULES

- Choose an **upper range limit (URL)** above the maximum operating pressure, including transients
- Calibrate the **span** close to the real operating window to preserve accuracy
- Check **overpressure** and **static-pressure limits** for DP devices
- Allow for water-hammer, pump surge, steam-out and hydrotest pressures

| UNIT | TO BAR |
|---|---|
| 1 psi | 0.0689 |
| 1 MPa | 10 |
| 1 kgf/cm² | 0.9807 |
| 1 in$H_2O$ (4 °C) | 0.002491 |
| 1 mmHg (torr) | 0.001333 |

# Rosemount pressure transmitter family.

Emerson's Rosemount range offers the broadest family of industrial pressure transmitters. Knowing the series and their positioning is the first step to selecting correctly.

## 3051C
**COPLANAR**

Most widely used pressure transmitter family. Differential, gauge and absolute pressure; coplanar flange simplifies manifold mounting.

## 3051T
**IN-LINE**

Gauge and absolute pressure with direct threaded or flanged in-line connection, extended pressure ranges.

## 3051L
**LIQUID LEVEL**

Flange-mounted DP level with remote seal(s) for tanks and vessels, especially corrosive or viscous liquids.

## 3051S
**SCALABLE**

Modular, higher-performance platform with advanced diagnostics, ranging flexibility and scalable architecture.

## 2088
**COMPACT IN-LINE**

Economical gauge / absolute pressure for general services where extreme accuracy or diagnostics are not required.

## 3095
**MULTIVARIABLE**

Measures DP, static pressure and process temperature together to compute mass flow without separate devices.

## Wireless
**WIRELESSHART**

Wireless versions of key pressure transmitters for installation without signal cabling.

## 2090
**HYGIENIC / LEVEL**

Sanitary pressure and level devices for food, beverage and pharmaceutical processes.



### WHICH ONE?

- Need **DP** for flow, level or fouling → 3051C / 3051S
- Single-point **gauge / absolute**, tighter budget → 2088 or 3051T
- Flanged **level** on a vessel → 3051L with seal
- Mass flow from one device → 3095 multivariable
- No cable route available → Wireless version

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# Rosemount 3051: configurations & ranges.

The 3051 platform is available in three primary configurations. Range codes set the upper range limit (URL) of the sensor.

| CONFIGURATION | MEASURES | CONNECTION | TYPICAL APPLICATIONS |
|---|---|---|---|
| **3051C (Coplanar)** | Differential, gauge, absolute | Coplanar flange with 1/4" NPT or flange adapters | Orifice-plate flow, DP level, filter DP, pump head |
| **3051T (In-line)** | Gauge, absolute | Direct in-line process connection | Pipeline, tank and header pressure; high ranges |
| **3051L (Liquid level)** | Level (DP with seals) | Flanged diaphragm, direct mount | Tanks and vessels, corrosive / viscous liquids |

### 3051C RANGE CODES (DIFFERENTIAL)

| RANGE | URL | URL (MBAR / BAR) | MIN. SPAN | TURNDOWN | TYPICAL USE |
|---|---|---|---|---|---|
| **1** | 25 $inH_2O$ | 62.3 mbar | 0.5 $inH_2O$ (1.2 mbar) | 50:1 | Very low DP, furnace draft |
| **2** | 250 $inH_2O$ | 623 mbar | 2.5 $inH_2O$ (6.2 mbar) | 100:1 | Low-DP flow, level in tanks |
| **3** | 1 000 $inH_2O$ | 2.49 bar | 10 $inH_2O$ (24.9 mbar) | 100:1 | Standard orifice flow, level |
| **4** | 300 psi | 20.7 bar | 3 psi (0.21 bar) | 100:1 | High DP, filters, pumps |
| **5** | 2 000 psi | 137.9 bar | 20 psi (1.38 bar) | 100:1 | Very high DP / wide spans |

Typical catalogue values for orientation. Static-pressure and overpressure limits depend on flange and bolting options.

### 3051C GAUGE RANGES (TYPICAL)

| RANGE | URL (PSI) | URL (BAR) |
|---|---|---|
| **1** | 30 | 2.07 |
| **2** | 150 | 10.3 |
| **3** | 800 | 55.2 |
| **4** | 4 000 | 275.8 |
| **5** | 10 000 | 689.5 |



### CHECK

Static pressure limit, overpressure limit and flange rating must exceed the line class.

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# Reading a model code.

Every Rosemount transmitter carries a unique model code that defines type, range, output, materials, connections and options. Changing a single character can change materials or certification.

**EXAMPLE STRUCTURE — 3051CD2A…**

| 3051 | C | D | 2 | A | 2 2 A 1 A | B4 M5 ... |
|---|---|---|---|---|---|---|
| Model | Type: Coplanar | Pressure: differential | Range code | Output | Materials / connections | Options |

| SEGMENT | WHAT IT DEFINES | WHAT TO SPECIFY IN THE RFQ |
|---|---|---|
| **Model** | Product family (3051, 3051S, 2088 …) | Family and configuration (C, T, L) |
| **Pressure type** | D = differential, G = gauge, A = absolute | Measurement type from the datasheet |
| **Range code** | Sensor URL (e.g. 2 = 250 in$H_2O$) and calibrated span | Min / max operating values and desired calibrated range |
| **Output** | A = 4–20 mA with HART (typical); other protocols | Signal / protocol, with or without display |
| **Materials of construction** | Isolating diaphragm, flange, drain / vent, O-ring | Fluid composition, temperature, corrosion data |
| **Process connection** | Flange type, adapters, manifold | Line size, connection standard, manifold type |
| **Options** | Display, bracket, hazardous-area approval, calibration & material certificates | Ex scheme, certificates, tagging, special cleaning |

## FREQUENTLY USED OPTION CODES (CONFIRM IN CURRENT DATA SHEET)

- **M5** LCD display
- **B4** Stainless-steel bracket
- **I1** ATEX intrinsic safety
- **E1** ATEX flameproof
- **I7 / E7** IECEx IS / flameproof
- **Q4** Calibration certificate
- **Q8** Material traceability to EN 10204 3.1
- **QT** Safety certificate (IEC 61508)
- **P1** Hydrostatic test certificate
- **P2** Special cleaning

### VERIFICATION RULE

The model code on the offer must match the datasheet character for character. On delivery, compare it with the nameplate and the certificate.

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# Wetted materials & fill fluids.

The isolating diaphragm, process flange and O-rings touch the process. Selecting them from the fluid—not from price—prevents corrosion, permeation and drift.

| DIAPHRAGM / WETTED MATERIAL | SUITABLE FOR (GUIDANCE) | AVOID / CAUTION |
|---|---|---|
| **316L stainless steel** | General hydrocarbons, water, steam, many chemicals | Chlorides at temperature, strong acids, seawater |
| **Alloy C-276 (Hastelloy)** | Chlorides, wet chlorine, many acids, sour gas | Strongly oxidising acids at high temperature |
| **Monel 400** | Seawater, hydrofluoric acid, alkalis | Oxidising acids, ammonia |
| **Tantalum** | Strong acids (HCl, $H_2SO_4$, $HNO_3$) | Hydrofluoric acid, strong alkalis |
| **Gold-plated diaphragm** | Hydrogen service — reduces hydrogen permeation | Mechanical damage to the plating |
| **Duplex / super duplex flange** | Chloride stress-corrosion cracking resistance | Check availability for the model |
| **PTFE / Viton / EPDM O-rings** | Chemical resistance by fluid and temperature | Wrong elastomer causes swelling and leakage |

## FILL FLUIDS (INSIDE THE SENSOR / SEAL)

| FLUID | USE |
|---|---|
| **Silicone oil** | General purpose, wide temperature |
| **Halocarbon** | Oxygen and chlorine service — compatible, non-flammable |
| **Glycerine / water** | Food-grade, low-temperature (check freezing point) |
| **High-temperature oils** | Remote seals above ~250 °C |



NACE

### Sour service

Wetted parts and bolting that comply with NACE MR0175 / ISO 15156 where $H_2S$ is present.

$O_2$

### Oxygen service

Special cleaning (e.g. option P2) and halocarbon fill fluid; certificate of cleanliness.

$H_2$

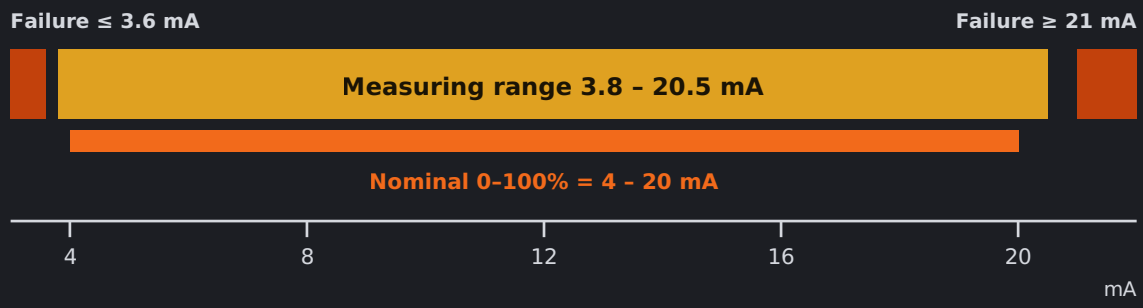
### Hydrogen

Gold-plated diaphragms reduce drift caused by hydrogen permeation.

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# Outputs & communication protocols.

The signal type links the instrument to the control system. Specify it with the I/O list, not with the transmitter alone.




NAMUR NE43 recommends a usable range of 3.8–20.5 mA and failure signalling at ≤ 3.6 mA or ≥ 21 mA.

| PROTOCOL | TYPE | TYPICAL USE | REMARKS |
|---|---|---|---|
| **4–20 mA** | Analogue | Universal DCS / PLC input | Two-wire, loop powered; simplest and most common |
| **4–20 mA + HART** | Analogue + digital | Configuration, diagnostics, multidrop | De-facto standard; HART communicator or AMS |
| **FOUNDATION Fieldbus** | Digital bus | Process plants with H1 segments | Multiple variables, control in the field |
| **PROFIBUS PA** | Digital bus | European / Siemens-centric DCS | Intrinsically safe segments |
| **WirelessHART** | Wireless mesh | Retrofits, remote monitoring | Battery powered; update rate configurable |
| **Modbus** | Serial digital | RTU / SCADA / skids | Used on packages and metering systems |

POWER

### Loop / supply

Typically 10.5–42.4 V DC for 4–20 mA devices; check the barrier or isolator voltage drop.

DISPLAY

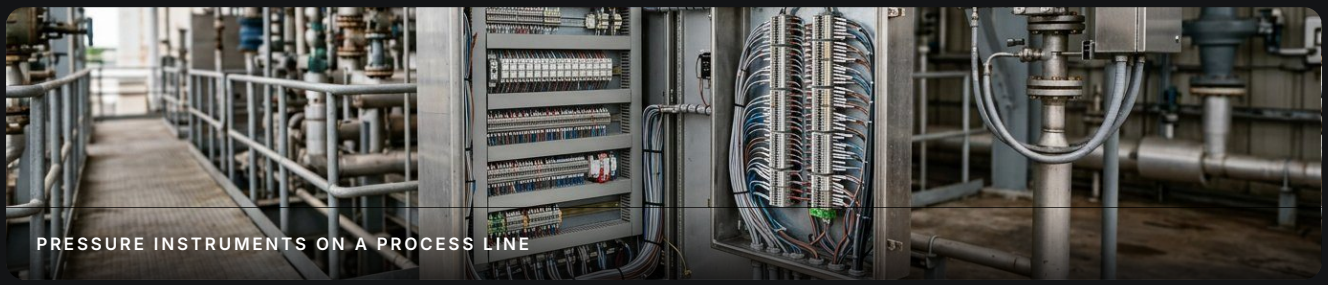
### Local indicator

Specify LCD / LED with engineering units and the language required by the operator.

ALARM

### Failure mode

Confirm high / low alarm direction (NAMUR or standard) with the control philosophy.



PRESSURE INSTRUMENTS ON A PROCESS LINE

# Hazardous areas & safety integrity.

Where flammable gas, vapour or dust may be present, every electrical instrument needs a certified protection concept that suits the zone and gas group.

## ZONES (IEC 60079-10)

| ZONE | FLAMMABLE ATMOSPHERE PRESENT | EQUIPMENT CATEGORY |
|---|---|---|
| **0** | Continuously / long periods (gas) | 1G / EPL Ga |
| **1** | Likely in normal operation | 2G / Gb |
| **2** | Unlikely, short duration | 3G / Gc |
| **20 / 21 / 22** | Combustible dust — same logic | 1D / 2D / 3D |

## TEMPERATURE CLASS

| T-CLASS | MAX. SURFACE TEMP. |
|---|---|
| **T1** | 450 °C |
| **T2** | 300 °C |
| **T3** | 200 °C |
| **T4** | 135 °C |
| **T5** | 100 °C |
| **T6** | 85 °C |

## PROTECTION CONCEPTS

| MARKING | CONCEPT | PRINCIPLE | TYPICAL FOR |
|---|---|---|---|
| **Ex ia / ib** | Intrinsic safety | Limits energy below ignition level; needs barrier or isolator | Transmitters in Zones 0 / 1, 2-wire loops |
| **Ex d** | Flameproof enclosure | Contains an internal explosion; flame paths cool escaping gas | Junction boxes, actuators, transmitters in Zone 1 |
| **Ex e** | Increased safety | No arcs / sparks in normal operation | Terminal boxes, glands, lighting |
| **Ex ec / nA** | Non-sparking | Zone 2 protection | Zone 2 field devices |
| **Ex t** | Dust ignition protection by enclosure | Dust-tight enclosure and surface temperature | Dust areas Zone 20 / 21 / 22 |

### EXAMPLE MARKING

**`Ex ia IIC T4 Ga`**

Intrinsically safe • gas group IIC (hydrogen, acetylene) • max. surface 135 °C • EPL Ga (Zone 0).

### SIL & IP

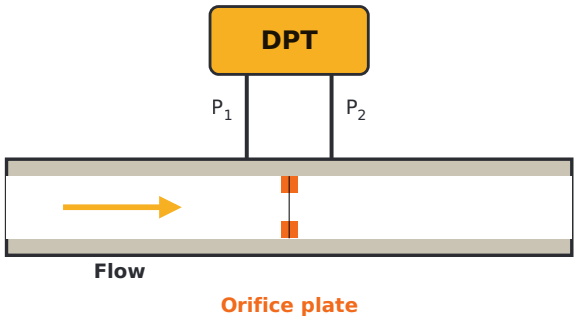
**SIL** (IEC 61508 / 61511): request the safety manual and certificate for the device and the achievable SIL (SIL 2 single, SIL 3 redundant typically). **IP**: IP66 / IP67 for outdoor installation.

### GAS GROUPS

IIA (propane) < IIB (ethylene) < IIC (hydrogen, acetylene). Equipment certified for IIC may be used in IIA and IIB.

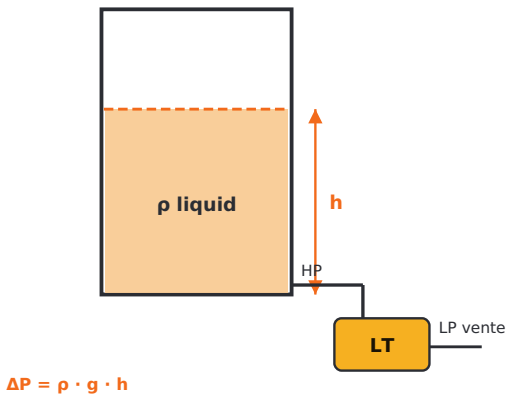
# Differential pressure: flow & level.

A DP transmitter infers flow from the pressure drop across a restriction, or level from the hydrostatic head of a liquid column.




### DP flow

Volumetric flow is proportional to the **square root** of the differential pressure: **Q ∝ √ΔP**. At 10% flow the DP is only 1% of the maximum — so turndown is limited without a square-root extractor and high-quality sensor.




### DP level

For an open tank: **ΔP = ρ · g · h**. Calibrate 0% at the HP tap elevation and 100% at the maximum liquid height; use wet or dry leg compensation on closed tanks.

## PRIMARY ELEMENTS FOR DP FLOW

| ELEMENT | STRENGTH | LIMITATION |
|---|---|---|
| **Orifice plate** | Cheap, standardised (ISO 5167), wide experience | Permanent pressure loss, wear of sharp edge |
| **Averaging pitot (Annubar type)** | Low pressure loss, easy to install in large pipes | Needs clean fluid and straight run |
| **Venturi / nozzle** | Low loss, high accuracy | Cost, size, installation length |
| **Wedge / cone** | Dirty, viscous or low-Reynolds fluids | Special calibration required |

MANIFOLD

### 3-valve / 5-valve

Isolates and equalises the transmitter for zero-checking and removal without shutting down the process.

IMPULSE

### Impulse lines

Short, sloped, free of trapped gas / liquid; use seal pots or condensate pots on steam.

STATIC

### Static limits

Check maximum static line pressure against the transmitter flange rating and DP sensor limit.

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# Remote seals & diaphragm seals.

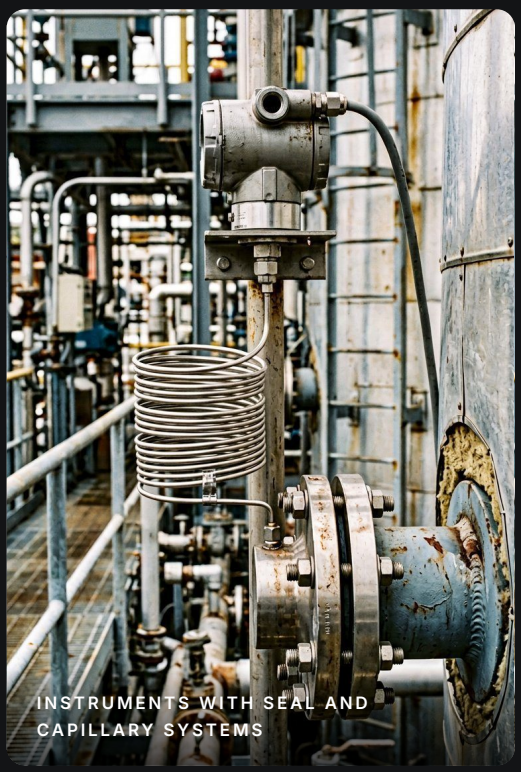
A diaphragm seal isolates the transmitter from the process; a fill fluid transmits pressure through a capillary or direct mount.

### USE A SEAL WHEN THE PROCESS IS

- Corrosive to standard wetted materials
- Highly viscous, crystallising or clogging
- Hot (> ~120 °C at the transmitter) or very cold
- Hygienic — flush mounting required
- Hazardous or toxic — no leak path wanted
- Remote — transmitter must be accessible

### TYPICAL SEAL TYPES

| TYPE | USE |
|---|---|
| **Flanged (flush / extended)** | Tank and line connection per ASME / EN flange |
| **Threaded** | Small lines, instrument connection |
| **Hygienic (tri-clamp, DIN 11851)** | Food, pharmaceutical |
| **Wafer / in-line** | Between flanges in a pipeline |



INSTRUMENTS WITH SEAL AND CAPILLARY SYSTEMS

### CAPILLARY EFFECTS

Long capillaries and large temperature swings create an error: the fill fluid expands. Keep capillaries short, equal in length for DP, and equally exposed to ambient temperature. Tag both seals.

### SPECIFY FOR EACH SEAL

Process connection and rating • wetted material • fill fluid • capillary length • armour • extension / diaphragm size • temperature range • NACE / oxygen cleaning.

### BRANDS

Diaphragm seals are available from WIKA, Emerson (Rosemount remote seals) and other manufacturers. A transmitter and its seal system are calibrated and supplied as a single assembly.

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# WIKA portfolio: pressure, temperature, seals.

WIKA is one of the world's leading manufacturers of pressure and temperature measurement — from mechanical gauges to process transmitters and diaphragm seals.

The WIKA family covers every tier of the application: **general-industry** transmitters, **process** transmitters with HART, **hygienic** variants, **DP** transmitters, **diaphragm seals**, **pressure gauges** and **temperature** sensors — plus calibration equipment.

## A-10

GENERAL INDUSTRY

Compact pressure transmitter for machinery and plant engineering.

## S-20

INDUSTRIAL

High-quality industrial pressure transmitter with multiple outputs and process connections.

## IPT-10 / 20

PROCESS

Process transmitters for the process industry with HART and flexible ranging options.

## UPT-20

HYGIENIC

Pressure transmitter for hygienic and food applications.

## DPT-10

DIFFERENTIAL PRESSURE

DP transmitter for flow, filters and level measurement.

## T32 series

TEMPERATURE

Head-mount temperature transmitters for RTD / thermocouple sensors.

GAUGES

### Mechanical pressure gauges

Bourdon-tube gauges to EN 837-1: dial sizes, case materials, liquid filling, safety pattern.

SEALS

### Diaphragm seals

Direct-mount and capillary seals, in a wide choice of materials and flange standards.

TEMP

### Temperature

Resistance thermometers, thermocouples, thermowells and transmitters.

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# Choosing between Rosemount & WIKA.

Both brands appear on most owner vendor lists. The right choice depends on the service tier, the vendor list and the lifecycle support the project needs — not on a single specification.

| CRITERION | ROSEMOUNT (EMERSON) | WIKA |
|---|---|---|
| **Positioning** | Broad process-industry range, strong in DP flow / level and safety-certified transmitters | Broad mechanical + electronic range; strong in gauges, seals and cost-effective transmitters |
| **Pressure transmitters** | 3051C / T / L, 3051S, 2088, 3095, wireless | A-10, S-20, IPT-10 / 20, UPT-20, DPT-10 |
| **DP flow & level** | 3051 + Annubar, 1199 seals, 3051L | DPT-10, diaphragm seals, level probes |
| **Temperature** | Head-mount and field transmitters, RTDs, thermowells | T32 series, TR / TC sensors, thermowells |
| **Diaphragm seals** | Remote seal systems (1199 family) | Extensive seal portfolio and capillary systems |
| **Typical sweet spot** | Critical, SIS, custody-adjacent, high-spec services | General-purpose, OEM, utilities, hygienic and sealed assemblies |
| **Documentation** | Calibration, material (EN 10204 3.1), IEC 61508 certificates available as options | Calibration, 3.1 material and approvals by series and option |

**RULE OF THUMB**

Start from the **client AVL**. If both brands are approved, compare lifecycle factors: spare-part strategy, HART / DD file support, calibration infrastructure and site familiarity.

**EQUIVALENT PROPOSALS**

If proposing an equivalent, list differences in range, wetted materials, approvals, output and dimensions in a deviation list — and get written client acceptance.



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# Pressure gauges: EN 837 quick guide.

Bourdon-tube gauges remain the most common local indicator. A correct gauge specification takes ten data points — not just the range.

## ACCURACY CLASSES (EN 837-1)

| CLASS | ERROR (% OF SPAN) | TYPICAL USE |
|---|---|---|
| **0.1 / 0.25** | ±0.1 / 0.25% | Test and calibration gauges |
| **0.6** | ±0.6% | Precision process gauges |
| **1.0** | ±1.0% | Standard process gauges |
| **1.6** | ±1.6% | General industrial |
| **2.5** | ±2.5% | Basic indicating |

## RANGE SELECTION (EN 837-2)

| LOAD | MAX. OPERATING PRESSURE |
|---|---|
| **Steady** | ≤ 75% of full scale |
| **Fluctuating** | ≤ 66% of full scale |
| **Short-term** | ≤ 100% of full scale |

Recommended practice: operating point near mid-scale for best resolution and life.

## SPECIFICATION CHECKLIST

DIAL

### Dial size

63, 100 or 160 mm. 100 mm is standard for process plants.

CASE

### Case material

Stainless steel for corrosive atmospheres; liquid filling to damp vibration.

FILL

### Liquid filling

Glycerine or silicone oil — reduces pulsation and vibration wear.

SAFETY

### Safety pattern S3

Solid baffle wall and blow-out back for hazardous fluids.

CONN

### Connection

½″ NPT or G½ lower mount; back mount optional.

WETTED

### Wetted parts

316L socket and Bourdon tube for corrosive media; diaphragm seal when required.



### ALWAYS SPECIFY

Range & units • dial size • class • case / wetted material • filling • connection & position • safety pattern • accessories (snubber, siphon, isolation valve) • special cleaning.

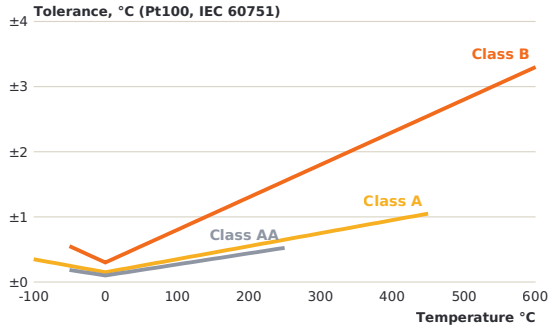
# Temperature measurement.

Two sensing principles cover almost every process: resistance thermometers (RTD) for accuracy and stability, thermocouples (TC) for range and speed.

## RTD VS. THERMOCOUPLE

| | RTD (PT100) | THERMOCOUPLE |
|---|---|---|
| **Range** | −200 to ~600 °C | −200 to > 1 000 °C (type dependent) |
| **Accuracy** | Higher, stable | Lower, drifts |
| **Response** | Slower | Faster |
| **Signal** | Resistance change | mV (needs cold-junction comp.) |
| **Cost** | Moderate | Lower |
| **Typical** | Process control | High-temperature, furnaces |

**Pt100 tolerance classes (IEC 60751)**




AA ±(0.10 + 0.0017|t|) • A ±(0.15 + 0.002|t|) • B ±(0.30 + 0.005|t|) °C

## COMMON THERMOCOUPLE TYPES (IEC 60584)

| TYPE | ALLOYS | TYPICAL RANGE | NOTES |
|---|---|---|---|
| **K** | Ni-Cr / Ni-Al | −200 to ~1 200 °C | General purpose; class 1 tolerance ±1.5 °C or ±0.4%; class 2 ±2.5 °C or ±0.75% |
| **J** | Fe / Cu-Ni | −40 to ~750 °C | Reducing atmospheres; iron element oxidises |
| **T** | Cu / Cu-Ni | −200 to ~350 °C | Low-temperature and cryogenic work |
| **N** | Ni-Cr-Si / Ni-Si | −200 to ~1 200 °C | Better stability than K at high temperature |
| **R / S** | Pt-Rh / Pt | 0 to ~1 600 °C | Furnaces, glass, high-accuracy high-temperature |

ASSEMBLY

### Sensor + well + head

Insert (spring-loaded), thermowell, extension, terminal head or transmitter. 3- or 4-wire RTD for long cable runs.

THERMOWELL

### Protect & allow removal

Tapered, straight or stepped; flanged, threaded or welded. Check wake-frequency per ASME PTC 19.3 TW.

TRANSMITTER

### Head vs. field

Rosemount 644 / 3144P and WIKA T32 convert the sensor signal to 4–20 mA with HART.

**SPECIFY**

Sensor type & tolerance class • element count • insertion length U • well material & type • process connection & rating • head / transmitter • Ex marking • calibration & material certificates (EN 10204 3.1 for wells).

Product families and option codes are named for orientation only. Ranges, accuracies, approvals and option codes change between product generations — always confirm against the manufacturer's current data sheet and the project datasheet. Brand names belong to their respective owners; PTF sources through verified, traceable channels and does not imply official-agency status unless documented.

# Flow & level technologies.

No single technology wins everywhere. Start from the fluid — conductivity, viscosity, solids, phase — and from the accuracy and turndown the process really needs.

| TECHNOLOGY | LIQUIDS | GASES / STEAM | SLURRY / DIRTY | NOTES |
|---|---|---|---|---|
| **Magnetic flowmeter** | Good | No | Good | Conductive liquids only (> ~5 µS/cm) |
| **Vortex** | Good | Good | Limited | Low-viscosity; straight run needed |
| **Coriolis** | Good | Good | Good | Direct mass flow & density; higher cost |
| **Ultrasonic (clamp-on)** | Good | Limited | Limited | Non-intrusive retrofits |
| **DP + primary element** | Good | Good | Limited | Standard, wide range of sizes |
| **Guided-wave radar** | Good | — | Good | Level — independent of density / vapour |
| **Non-contact radar** | Good | — | Good | Level — no wetted parts, tanks & silos |
| **DP level** | Good | — | Limited | Needs density known; wet / dry leg |

### FLOW — QUICK SELECTION

- **Clean conductive water / chemicals** → magnetic
- **Steam & gas, moderate turndown** → vortex or DP
- **Custody-grade, viscous, density needed** → Coriolis
- **Retrofit with no shutdown** → clamp-on ultrasonic
- **Large pipes, low pressure drop** → averaging pitot

### LEVEL — QUICK SELECTION

- **Most liquids** → radar (guided-wave or non-contact)
- **Foam, vapour, changing density** → guided-wave radar
- **Pressurised vessels, known density** → DP with seals
- **Interface / two liquids** → GWR or displacer
- **High / low alarms only** → vibrating-fork or float switches

REYNOLDS

**Check flow regime**

Vortex and DP devices need a minimum Reynolds number; viscous fluids may need Coriolis or wedge elements.

STRAIGHT RUN

**Piping effects**

Keep upstream / downstream straight lengths per the manufacturer; use flow conditioners where space is short.

SIZING

**Line size vs. meter size**

Size the meter to the flow range — not automatically to the line size. Reducers are normal practice.



PROCESS SKID WITH FLOW AND PRESSURE INSTRUMENTATION

# Installation & calibration good practice.

Most field problems come from impulse piping, mounting and zero drift — not from the instrument itself.

## INSTALLATION

- Mount DP transmitters **below** the taps for liquids, **above** for gases, with sloped impulse lines (≈ 1 : 12 or 1 inch per foot)
- Use a 3- or 5-valve manifold and a vent / drain on the sensor
- Keep impulse lines short, equal, and heat-traced or insulated when freezing is possible
- Provide straight run for flow elements (e.g. 10D / 5D) per the manufacturer
- Orient the housing so conduit entries point down; seal with Ex-rated glands
- Tag the instrument and its cable; record the model code and serial number



TRANSMITTER MOUNTED ON A MANIFOLD

## CALIBRATION & COMMISSIONING

### Five-point calibration

Apply 0, 25, 50, 75 and 100% of span, up and down. Record **as-found** and **as-left** values. Reference standards should be at least four times more accurate than the device (4:1 ratio) and traceable (e.g. ISO / IEC 17025).

### Zero trim & range

After installation, equalise the manifold and perform a zero trim for DP / gauge units. Configure range, units, damping, alarm direction and tag using HART. Save the configuration file.

**LOOP CHECK**

Verify 4–20 mA at the DCS at 0 / 50 / 100%, alarm points and failure mode before sign-off. Keep calibration certificates in the loop folder.



FIELD INSTRUMENTS ON A PROCESS SKID

# RFQ data sheet for instruments.

Copy this template into your inquiry. A complete list lets PTF return a technically clean, comparable offer — in the first round.

| | |
|---|---|
| **Project / client** | AVL reference |
| **Tag number(s)** | Quantity |
| **Measurement** | Pressure G / A / DP, temperature, flow, level |
| **Brand / model code** | or equivalent specification |
| **Process fluid** | Phase, composition, corrosion data |
| **Operating / design pressure** | min / normal / max |
| **Operating / design temperature** | min / normal / max |
| **Calibrated range & units** | e.g. 0–10 bar |
| **Wetted materials** | diaphragm / flange / O-ring / fill |
| **Process connection** | size, rating, standard |
| **Output & protocol** | 4–20 mA HART, FF, PA … |
| **Hazardous area** | zone / group / T-class / Ex type |
| **SIL requirement** | yes / no, level |
| **Housing & IP** | material, entries |
| **Accessories** | manifold, seal, bracket, thermowell |
| **Certificates** | calibration, EN 10204 3.1, COC, Ex |
| **Inspection** | TPI / FAT / witness |
| **Delivery** | location, date, packing |

SUBMIT

### Online RFQ

pishtaj.ir/rfq — coded, trackable, with attachments.

TRACK

### Status

Use the tracking code to follow review, sourcing and offer status.

ASK

### Engineering help

info@pishtaj.ir • +98 992 586 8479 (sales engineering).

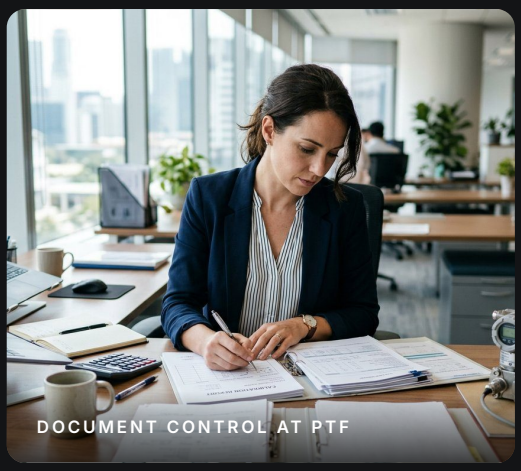
# Delivery documents & authenticity control.

For instrumentation, quality is proven by documents and by the match between nameplate, model code and certificates.

| DOCUMENT | CONTENT | CHECK |
|---|---|---|
| **Calibration certificate** | As-found / as-left data, reference standard, date | Serial number matches the device; range matches datasheet |
| **Material certificate (EN 10204 3.1)** | Heat numbers, chemistry, mechanical data for wetted parts | Traceability to the option code ordered |
| **Ex certificate** | ATEX / IECEx certificate and marking | Zone, group, T-class vs. datasheet; certificate number on nameplate |
| **Certificate of conformity (COC)** | Declaration of conformity with order | Scope and model code stated |
| **Safety manual / SIL certificate** | Failure rates, proof-test intervals | Only where SIL is specified |
| **Datasheet / manuals** | Final revision, wiring, installation | Revision equals PO |

## VERIFY ON RECEIPT

- Nameplate model code equals PO and datasheet
- Serial number on device equals certificates
- Firmware / hardware revision per project requirement
- Condition: new, unused, sealed packing, no corrosion
- Accessories included: manifold, bracket, glands, plugs
- Tag and packing list correct


DOCUMENT CONTROL AT PTF

## SOURCING & AUTHENTICITY

PTF distinguishes between **official agency** and **sourcing from traceable, authorised channels**. Source, stock status, warranty terms and documents are stated in each offer. See Catalog 04 for the full receiving-inspection checklists.

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SCAN TO SUBMIT AN RFQ